

D1026

Attachment 2

SYSTEM SPECIFICATION

FOR THE

VESSEL TRAFFIC SERVICES  
SYSTEM

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## 1. SCOPE

### 1.1 IDENTIFICATION

This document defines the system level performance requirements for the United States Coast Guard Ports and Waterways Safety System (PAWSS) Project Vessel Traffic Service (VTS) system, facilities, and support for the Port of New Orleans, LA and other ports as determined by the Coast Guard. The VTS total system requirements are described in this specification, the associated statement of work and task orders, and the contract.

### 1.2 SYSTEM OVERVIEW

A VTS system (hereafter referred to as the "system") collects, processes, and disseminates information on the marine operating environment and maritime vessel traffic. The VTS system provides the mariner with the information necessary to prevent or avoid collisions, allisions and groundings. Where situations warrant, VTSSs provide recommendations or direction to vessel masters. VTSSs also support other Coast Guard missions through the exchange of information with appropriate Coast Guard units.

An essential element of the system is that it is based upon Automatic Identification System (AIS) technology as a means to provide timely, relevant, and accurate information to the mariner. Use of vessel transponders is essential for three reasons:

- (a) AIS technologies have the potential to improve safe navigation both inside and outside a Vessel Traffic Service Area (VTSA),
- (b) Information collection and transmission by the system will be less intrusive and distracting to the mariner than a voice-based system, and
- (c) AIS transponders are gaining worldwide acceptance as a cost-effective means of vessel-to-shore and vessel-to-vessel information exchange.

A goal of the VTS program is to use AIS and other design technologies that enable information gathering and dissemination in ways that add no additional burden to the mariner. The system shall ensure that continuity of service is provided throughout the VTSA without adding workload or distracting the mariner from his/her duties; i.e., the system adds value, improves safety and efficiency, and is not laborious to vessel operators.

The VTS system shall use Commercial Off-the-Shelf (COTS) and/or Government Off-the-Shelf (GOTS) equipment and software to the maximum extent possible. The architecture will follow open systems standards to the maximum extent possible and will use modular

design to extend capabilities and insert state-of-the-market technology in future incremental builds or ports. Each successive incremental build or port system will implement proven and available technology.

The system at each port consists of a Vessel Traffic Center (VTC) that receives data from AIS-equipped vessels, surveillance sensors, or directly from vessel operators. Meteorologic and hydrographic data is also received at the VTC. Automatic data processing equipment is used to provide operators in the VTC with decision support.

The system includes AIS, surveillance, meteorologic and hydrographic information sources as well as participating vessels and shore-based users with whom information is exchanged. Information flow is via communications comprised of common carrier and, possibly, dedicated networks, and maritime mobile radio services within the VTSA. Primary functional areas are data processing, AIS and surveillance processing, decision support processing, and databases; recording and playback, which supports operational analysis and training activities; system administration; system performance monitoring; the human-system interface; and various services such as security and utilities that are required to support operations.

The system is planned to operate in the port of New Orleans and other ports as determined by the USCG.

### 1.3 DOCUMENT OVERVIEW

This specification provides requirements for a VTS system in New Orleans and includes information for upgrades and future ports. Section 1 provides overview material, Section 2 contains referenced documents, Section 3 contains the system requirements, Section 4 contains the qualifications provisions, Section 5 contains the Requirements Traceability Matrix, and Section 6 contains the Glossary.

In this specification, the verb "shall" identifies the mandatory requirements imposed on the hardware and software for the system. When used in a statement in this specification in the context of "the Government will," the use of "will" implies an action by other than the system vendor. When "will" is used in all other contexts, it simply indicates the future tense.

It is not the intent of this specification to limit existing Vessel Traffic Service (VTS) Commercial-Off-The-Shelf (COTS) system designs. Any "shall" that cannot be met by an existing VTS COTS design will be identified by the vendor and alternatives, if any, discussed. Likewise, any existing COTS design that exceeds the "shall" contained in the specification, and which are offered as part of the system to be delivered, will be identified and discussed.

## 2. REFERENCED DOCUMENTS

A list of the documents referenced in this Specification is presented below. Compliance with these documents is required to the degree specified within this specification. All referenced documents are available on the Internet

### 2.1 COAST GUARD DOCUMENTS

1721798	System Interface Design Document for the Surface Search Radar Program	1 Jul 1997
TBD (to be determined)	Radar Data Service Communication User Manual for the Surface Search Radar Program	1 Jul 1997

### 2.2 OTHER GOVERNMENT DOCUMENTS

33 CFR	Title 33 Code of Federal Regulations: Part 3 - Coast Guard Areas, Districts, Marine Inspection Zones, and Captain of the Port Zones; part 161 - Vessel Traffic Management; Part 164 - Navigation Safety Regulations	1 Jul 1995
47 CFR	Title 47 Code of Federal Regulations: Part 2 - Frequency Allocation and Radio Treaty Matters; Part 15 - Radio Frequency Devices; Part 80 - Stations in the Maritime Services	1 Jul 1995
Fed-STD-795	Uniform Federal Accessibility Standards	1 Apr 1988

### 2.3 NON-GOVERNMENT DOCUMENTS

BOCA NBC-93	Building Officials and Code Administrators (BOCA) National Building Code	1993
SBCCI	Southern Building Code Congress International, Inc. (SBCCI) Standard Building Code	1994

ICBO	International Conference of Building Officials (ICBO) Uniform Building Code	1994
NFPA 70	National Electric Code	1996
NFPA 75	National Fire Prevention Association Protection of Electronic Computer/Data Processing Equipment	1995
NFPA 101	Life Safety Code	1997
OSHA	Occupational Safety and Health Act	1970
Draft Revision to ITU-R M.825-1(Draft)	Characteristics of a Transponder System Using Digital Selective Calling Techniques for Use with Vessel Traffic Services And Ship-to-Ship Identification.	1997
ITU-R M.541-7	Operational Procedures for the Use of Digital Selective Calling (DSC) Equipment in the Maritime Mobile Service	1997
ITU-R M.493-8	Digital Selective Calling System for Use in the Maritime Mobile Service	1997
Draft Revision of Recommendation ITU-R M.1084	Interim Solutions for Improved Efficiency in the Use of the Band 156-174MHz by Stations in the Maritime Mobile Service	1996
NTSC RS-170A	National Television System Committee (NTSC)	

### 3. REQUIREMENTS

#### 3.1 CONCEPT OF OPERATIONS

The VTS concept of operations includes two modes of operation as follows:

**Routine** - The system will operate in a routine commercial environment as an information processing and decision support system. By providing accurate, relevant, and timely information to mariners to support their independent decision-making, the system will facilitate commerce, reduce the risk of accidents, and protect the environment. The system will also use its information and communications capabilities to help Coast Guard operational commanders accomplish their missions and to provide private users with marine traffic and safety information.

**Contingency Response** - The system will respond to two types of national contingencies: (1) a national defense emergency which involves the movement of government, public or private vessels in response to a security threat, and (2) a port emergency which involves the movement of government, public or private vessels in response to an environmental or civil disaster. The primary role of the system in either type of emergency is to facilitate the movement of response vessels without disrupting the orderly flow of commerce. The system contingency operation is similar to the routine concept of operations. In general, a contingency requires an increased state of awareness on the part of VTS personnel, modification of sectors or VTS boundaries, or concentrating surveillance on a particular area.

##### 3.1.1 CRITICAL CAPABILITIES

The system critical capabilities are:

Communications - Provide two-way voice and data communications among mandatory participants throughout and surrounding the Vessel Traffic Service Area (VTSA) and navigable waters extending beyond the exit and entrance to the VTSA as required by Task Order.

Surveillance - Provide simultaneous display of all VTSA position information.

##### 3.1.2 GEOGRAPHIC AREA

The system shall operate in the following geographic area types:  
(1) open ocean, (2) convergence, (3) open bay, (4) enclosed harbor, (5) restricted waterway, and (6) river.

### 3.2 SYSTEM REQUIREMENTS

The system is composed of three segments: operational, facilities, and support. Capability requirements for each of these segments are specified in Sections 3.2.1 - 3.8, respectively, as shown in Figure 3.1.

Operational Segment	Facilities Segment
<ul style="list-style-type: none"> <li>- Automatic Identification System (AIS) Services</li> <li>- Independent Surveillance</li> <li>- Operational Data Processing</li> <li>- Communications Services VTC/Remote Sites</li> <li>- Decision Support Vessel Data Non-vessel Data Transit Data Alerts and Alarms Advisories</li> <li>- Human System Interface</li> <li>- Maritime Mobile Radio Services</li> <li>- Remote Sites</li> <li>- Recording and Playback</li> <li>- Central Timing</li> </ul>	<ul style="list-style-type: none"> <li>- Buildings, Utilities, and Associated Services</li> <li>VTC, Towers, Shelters</li> <li>Access and Parking</li> <li>Power and Water</li> <li>HVAC, Plumbing, Lighting</li> <li>Safety, Fire Protection, Security</li> <li>Internal Cable Plant</li> <li>Telephone Station</li> <li>Equipment</li> </ul> <p><b>Support Segment</b></p> <ul style="list-style-type: none"> <li>- Software Development and Maintenance</li> <li>- System Administration and Maintenance</li> </ul>

Figure 3-1. SYSTEM SEGMENTS

#### 3.2.1 OPERATIONAL SEGMENT

The system operational segment consists of the following functional areas: AIS, independent surveillance, operational data processing, decision support, communications, human-system interface (HSI), recording and playback, and central timing.

##### 3.2.1.1 SURVEILLANCE

The system shall acquire vessel positions through AIS and independent surveillance such as radar and related systems as specified in the Task Order. The system shall use active or passive devices for alignment and calibration of these systems. AIS, radar or other related systems shall use off-the-shelf equipment.

##### 3.2.1.1.1 AUTOMATIC IDENTIFICATION SYSTEM (AIS)

The system shall have the capability to transmit, receive and process position, speed, course, identity and other information from AIS equipment as specified in the draft revision to

Recommendation ITU-R M.825-1(Draft), ITU-R M.541 and ITU-R M.493. The system shall be capable of operating on frequency channels with 25kHz and 12.5kHz spacing in accordance with Annex 3 of Recommendation ITU-R M.1084.

### **3.2.1.1.2 RADAR CAPABILITIES**

The system shall provide the following radar surveillance capabilities to:

- a. Provide radar position information when this capability is required to meet individual port requirements.
- b. Detect vessels greater than eight (8) meters in length.
- c. Monitor the position of floating aids to navigation.
- d. Monitor federal anchorages with sufficient resolution to measure the shortest distances between anchored vessels.
- e. Reduce land, water, weather, and electronic clutter, ghosts and false alarms.
- f. Provide resolution to prevent target swapping, and to provide the accuracy required for automatic tracking.
- g. Provide processed radar data to the VTC operators.
- h. Provide a position update interval of no greater than three (3) seconds.
- i. Provide VTC remote control of on/off and all features of the equipment.
- j. Provide compatibility with the Surface Search Radar (SSR), antenna, and radar processor for incremental builds or future ports. Compatibility and interface requirements are provided in the SSR System Interface Design Document and the SSR Radar Data Service Communication User Manual.
- k. Provide the surveillance performance in operational conditions described in Section 3.6.

### **3.2.1.1.3 CLOSED CIRCUIT TELEVISION (CCTV)**

CCTV capability may be required for future incremental builds or ports if specified by Task Order.

#### **3.2.1.1.3.1 CCTV VIDEO SIGNAL STANDARDS**

CCTV cameras shall provide National Television System Committee (NTSC) RS-170A color video imagery capability. The cameras shall provide 24 hours per day operation.

CCTV cameras shall utilize image intensification or infrared imaging to provide RS-170A monochrome video imagery from dusk to dawn, with a sensitivity of 0.01 footcandles or better.

### **3.2.1.1.3.2 CCTV CAPABILITIES**

The CCTV system shall provide:

- a. Coverage for selected areas within the VTSA as specified in the appropriate Task Order.
- b. The ability for the operator to determine the presence or absence of mandatory participants of 8 meters minimum length at a range of at least 5 nautical miles (nm) during high visibility conditions.
- c. The ability for the operator to correctly classify type of vessel of 8 meters minimum length at a range of at least 2.5 nm during high visibility conditions.
- d. The ability for the operator to read a 4-inch high name (46 CFR 67.15-3) and other distinguishing markings of mandatory participants and selected vessels at a range of at least 1/4 nm, and a 16-inch high name at 1.0 nm during the day under high visibility conditions and with a contrast ratio of at least 10:1.
- e. The ability to record and time-tag all CCTV imagery to enable recording and playback synchronization with other recorded and time-tagged information (Section 3.2.1.8, Information Recording and Replay).

### **3.2.1.1.4 SURVEILLANCE INTEGRITY**

The system shall be optimized for tracking of surface contacts in a marine environment. The system shall not degrade the accuracy and integrity of sensor data throughout the system.

### **3.2.1.2 VESSEL POSITION TRACKING**

The system shall provide vessel position tracking throughout the VTSA. Section 3.2.1.2.1 describes tracking with AIS or independent surveillance coverage and Section 3.2.1.2.2 describes the requirements for estimated position (EP) tracking. Each type of track shall have a unique icon.

#### **3.2.1.2.1 TARGET TRACKING CAPABILITIES**

The system shall provide the following tracking capability using either AIS or independent surveillance inputs:

- a. Provide vessel position, course, speed, and track history.

- b. Provide predicted position tracks when there are interruptions in coverage due to sensor availability or signal degradation or loss.
- c. Allow the operator to terminate predicted position tracks and select estimated position (EP) tracking (see Section 3.2.1.2.2).
- d. Associate available vessel data (Section 3.2.1.4.2, Vessel Data) and transit data (Section 3.2.1.4.3, Transit Data) with tracks.
- e. Provide manual track initiation, reposition, editing, and deletion procedures to allow the operator to override active track data (e.g., correct swapped tracks, re-establish tracks of EP tracks).
- f. May allow the operator to select a time limit for predicted position tracks and alert the operator when the time limit is reached to permit dropping the track or changing to an EP track.
- g. Accept inputs from up to eight (8) radars with a minimum for each radar sensor of 200 targets per scan.

#### **3.2.1.2.2 ESTIMATED POSITION CAPABILITIES**

The system shall provide the following estimated position tracking capabilities:

- a. Provide the capability to initiate, reposition, edit, and delete tracks using the last known vessel position data.
- b. Provide the capability to establish a vessel track in lieu of the last reported vessel position data (EP track).
- c. Provide EP track current position, course, speed, and position history.
- d. Allow EP tracks to be initiated at least 15 minutes before a vessel enters the VTSA.
- e. Associate available vessel data (Section 3.2.1.4.2) and transit data (Section 3.2.1.4.3) with tracks.

#### **3.2.1.3 VESSEL POSITION ACCURACY AND RESOLUTION**

Vessel position accuracy using AIS (DGPS) shall be 10 meters (2drms) or better as measured from the GPS receiver's antenna location. Vessel position resolution using processed radar data shall be 80 meters (rms) of actual position or better for a radar to target distance of 3 nm and to within 530 meters (rms) of actual position for a radar to target distance of 20 nm.

### 3.2.1.4 OPERATIONAL DATA

The system shall provide the capability to retrieve and display the following types of information from the indicated external Government information systems as specified by Task Order. The system shall utilize Government-provided telecommunications services for external data access and shall conform to the access requirements and information characteristics described in the approved interface control documentation.

- a. Vessel information from Lloyd's Database.
- b. Vessel Identification and Documentation System (VIDS) data.

#### 3.2.1.4.1 VESSEL TRAFFIC SERVICE AREA ELECTRONIC CHART DATA

The system shall use vendor supplied electronic charts or Government-Furnished charts as specified by the Task Order. The charts must be capable of incorporating port-specific data and be easily updated. Table 3-2-1 provides an example of VTSA adaptation data categories that shall be displayed as a part of VTSA electronic charts.

Electronic chart displays must also be capable of depicting port-unique standard routes and zones.

**TABLE 3-2-1. VTSA ADAPTATION DATA**

CATEGORY	GENERAL DESCRIPTION
Port Geography	Shoreline and landmarks important to mariners navigating in the VTSA
Port Structure	Descriptions and positions of structures such as bridges, breakwaters, levees, dams, dry-docks, wharves, and piers
Aids to Navigation	Charted positions and descriptions of navigational aids such as buoys, lights, ranges, beacons, and markers
Obstructions	Positions and dimensions (including minimum height above water referenced to mean higher high water (MHHW) for over water hazards and minimum water depth reference to mean lower low water (MLLW) for underwater hazards) of all reported hazards to navigation, such as rocks, wrecks, reefs, bridges, underwater pipelines, and overhead cables
Traffic Lanes	Dredged channels, safety fairways, traffic routes, and traffic separation schemes within and leading into the VTSA
Zones	Positions, boundaries, and restrictions for officially designated safety and security zones and regulated areas
Anchorage	Position, boundaries, and type of anchorage

#### 3.2.1.4.2 VESSEL DATA

The system shall store vessel data items such as those shown in Table 3-2-2 unless otherwise specified in the Task Order. Local

operations and procedures will specify the requirements for updating the data.

**TABLE 3-2-2. VESSEL DATA**

ITEM NAME	DESCRIPTION
Vessel* identification	Present and previous with date of change
Vessel official number	From Lloyd's database, if vessel is listed there
Vessel type	General description (tanker, tug, ferry, etc.)
Length overall	Maximum length, bow to stern
Beam	Width at widest point
Gross tonnage	Registered gross tonnage
Registry	Country of registry

\* Vessel applies only to mandatory participants and selected vessels.

#### 3.2.1.4.3 TRANSIT DATA

The system shall collect and store for each vessel transit, data items such as those described in Table 3-2-3 unless otherwise specified in the Task Order.

**TABLE 3-2-3. TRANSIT DATA**

ITEM NAME	DESCRIPTION
Vessel identification	Name of vessel
Vessel official number	Lloyds' or other official unique identifier
Vessel position	Latitude/longitude or range/bearing
Vessel speed over ground	True speed over ground
Vessel course over ground	True course over ground, or direction (upbound, downbound, crossing) for a riverine situation
Destination	As reported from vessel
Specific cargo	Hazardous or non-hazardous. If hazardous, cargo description
Air draft, if COTS. ( See 3.2.1.4.4)	As reported from vessel
Loaded draft	As reported from vessel

#### 3.2.1.4.4 ADVISORY DATA

Advisories are notifications that a situation exists that is out of the ordinary, but the situation does not require evasive or emergency action. Table 3-2-4 contains a summary of the advisory data that the system shall provide to the VTC operator unless otherwise specified in the Task Order.

**TABLE 3-2-4. OPERATIONAL ADVISORIES**

	<b>TYPE</b>	<b>DESCRIPTION</b>
1.	CG Navigation Notices/Marine Information Broadcasts	As required.
2.	Navigation Safety Advisories	As required by VTSA conditions
3.	Presence of Vessel Maneuvering Restrictions	As required by VTSA and vessel conditions
4.	Vessel Required Equipment Limitations	As required by limitations
5.	Notice of Vessel Maneuvering Restrictions	As required by restrictions
6.	ATON Status Change	ATON not displaying advertised characteristics
7.	High Risk Transit	Vessel* engaging in high risk transit
9.	Air Draft	Vessel in danger of hitting overhead obstruction
10.	Swing Circle	Vessel is anchored so that its swing circle extends into traffic, other swing circles, and space management zones
11.	Obstructions or restrictions to navigation	Monitor and advise
12.	Emergency and environmental conditions	Provide timely information on conditions that might affect decisions of the mariner
13.	Special Interest Vessel	Vessel has unusual/special reporting requirements
14.	Special activity data	Type, duration, position, number of participants involved and the point of contact for the activity
15.	Incident Data	Standard template that includes relevant data such as type, time, position, vessels involved and environmental conditions associated with incident

\* Vessel applies only to mandatory participants and selected vessels .

#### **3.2.1.4.5 AIDS TO NAVIGATION (ATON) DATA**

The system shall assist operators in maintaining an ATON discrepancy log to record and store any reported ATON discrepancies.

#### **3.2.1.4.6 METEOROLOGIC (WEATHER) DATA**

National Weather Service (NWS) weather predictions and information on present weather conditions in and around the VTSA shall be made available to the VTC operators. The system shall collect and display meteorologic information from existing local weather sensors if required by Task Order.

#### **3.2.1.4.7 OCEANOGRAPHIC AND HYDROGRAPHIC DATA**

The system shall collect and display oceanographic and hydrographic data available via existing local systems such as the National Oceanic and Atmospheric Administration (NOAA) Physical Oceanographic Real Time System (PORTS) and other external systems if required by Task Order.

#### **3.2.1.4.8 DECISION SUPPORT**

The system shall provide decision support capabilities to aid operators and users in their decision making. The capabilities include on-demand predictions and calculations, alerts and alarms, advisories, operational notices, and reports. The system shall support simultaneous operator requests for information.

The system shall provide waterway traffic situation information to the operator that is not more than fifteen (15) seconds old.

The system shall allow projected vessel positions to be displayed using dead reckoning information. The system shall provide predicted locations of these vessels up to 3 hours or up to 30 nautical miles (nm) in advance and to a precision of 0.20 nm for a 30-minute prediction, and to a precision of 1.0 nm for a 3 hour prediction.

The system shall include a decision aid to alert the operator when a participating vessel is in danger of departing from a standard route or an agreed to sailing plan.

The system shall prescribe alarm boundaries to safeguard areas or vessels of particular concern.

The system shall monitor vessel positions and movement in anchorages and fleeting areas and alert the operator if a vessel appears to be dragging anchor.

#### **3.2.1.5 COMMUNICATIONS**

The system will use AIS technology to reduce the need for voice communications. However, voice communications are still required for emergencies and communications with non-AIS equipped vessels. Communications shall include all systems providing communications between the VTC and vessels, between the VTC and remote sites, and between the VTC and external users and systems.

The system shall incorporate all telecommunications capabilities extending out to the telecommunications demarcation point as specified in the approved Telecommunications Service Requests and related documentation such as the port-specific Task Orders. The system shall provide the operators the capability to utilize a standard headset for both radio communications and with the vendor provided voice-telephone, intercom and public address systems.

##### **3.2.1.5.1 RADIO**

The system shall provide communications capability between operators and vessels in the VTSA via the Maritime Mobile Radio Service. AIS requirements are specified in Section 3.2.1.1.1. The system shall provide continuous radio coverage to each operator throughout the VTSA. The system shall provide additional

continuous radio coverage beyond the VTSA so that vessels may report into the VTC from navigable waters up to one hour prior to entrance into the VTSA.

The system radio communications shall be capable of operating in all FCC type-accepted VHF modes, in accordance with Part 80 of the FCC Rules (47 CFR) for the Maritime Mobile Radio Service and on the VTS designated frequencies as specified in 33 CFR Part 161.

#### **3.2.1.5.2 SWITCHING AND ROUTING**

The system shall provide the following communications switching and routing capabilities at each port installation:

- a. Based on active sector definitions, routing and distribution of communications to the appropriate VTC workstations.
- b. Routing and distribution of all modes of communications used by the system within and among port system facilities including the VTC and remote sites.
- c. Routing and distribution of all recorded communications used by the system within the VTC.
- d. Switching and routing of audio communications among sources and destinations, including but not limited to:
  1. Radio channels.
  2. Operators' headsets.
  3. Telephone station sets.
  4. Intercom.
  5. Public Address.
  6. Local telephone utility.
  7. Audio playback of recorded information.
  8. Workstation speakers.

#### **3.2.1.6 HUMAN SYSTEM INTERFACE**

##### **3.2.1.6.1 GENERAL**

The system's human-system interface (HSI) design shall integrate data from multiple sources into composite displays and present an integrated traffic image that reflects the current situation.

The system HSI design should balance system requirements for the working environment, display layout, and ease of use while considering the combinations of personnel skill levels and workloads.

### 3.2.1.6.2 DISPLAY LAYOUT

The system HSI design should provide flexibility in organizing and presenting information to operators using methods permitting arrangements that enhance operator performance.

### 3.2.1.6.3 EASE OF USE

The system HSI design shall provide for operator ease of use and minimal operator actions in performing tasks. Methods for achieving operator ease of use shall include but not be limited to rapid data base query, efficient text entry, operator assistance for complex tasks, and techniques allowing unobtrusive interface with vessels on the waterway.

### 3.2.1.7 OPERATIONAL SEGMENT HARDWARE

Each operator workstation shall include but not be limited to the following unless otherwise specified by the Task Order:

- a. Standard English QWERTY keyboard for data entry.
- b. Pointing device such as track ball, mouse, or pen.
- c. High resolution color displays permitting operator adjustment.
- d. Headsets providing the following capabilities unless otherwise specified in the Task Order:
  1. All headsets shall be interchangeable.
  2. Each workstation shall accommodate a minimum of two headsets.
  3. Each headset shall provide binaural output.
  4. Each headset shall provide microphone input.
  5. Independent volume controls for each earpiece.
  6. Adjustable gain for each microphone.
  7. Push-to-talk, foot-activated or other transmit/receive methods.
- e. The capability to monitor voice communications on at least four different channels continuously and simultaneously.
- f. Speaker(s) with individual volume controls.
- g. Mute buttons with a mute indication. Muting shall be selectable and not prevent the simultaneous capability to record incoming communications that have been muted.
- h. Remote controls of equipment.
- i. Control, configuration, and re-configuration of local and remote site surveillance sensors.

- j. System data processors shall access all information within one (1) second after operator request.
- k. Each operator shall have the capability on-line to print selected data on monochrome and color printers.

#### **3.2.1.8 INFORMATION RECORDING AND REPLAY**

The system shall record, time tag and retain the following data for a period of 32 days (some data may be archived longer than 32 days).

- a. Data used to create traffic situation displays.
- b. Alerts, alarms, and advisories.
- c. Voice communications, including radio and telephone, at each work station.

Data shall be recorded for incident analysis, training, transit planning and evaluation. The system shall store and retrieve data in user-selected formats.

#### **3.2.1.9 ADAPTABILITY, SCALEABILITY, AND FLEXIBILITY**

The system hardware and software shall be modular, adaptable, portable, and scaleable. The system shall be sufficiently flexible in design to enable the implementation of increased levels of performance, future capabilities and to expand the area of coverage of any previously-installed port system.

#### **3.2.1.10 CENTRAL TIMING**

All system equipment with critical timing and inter-equipment time synchronization requirements, such as workstation processor clocks and time-stamped data recording, shall be synchronized by a central timing element with a resolution of  $\pm 1$  msec. All equipment time clocks shall remain synchronized within  $\pm 1$ sec per day.

#### **3.2.1.11 YEAR 2000 COMPLIANCE**

The system shall perform fault-free in the processing of date and date-related data (including, but not limited to calculating, comparing, and sequencing) by all hardware, telecommunications and software products delivered individually and in combination upon installation. Fault-free performance includes the manipulation of data with dates prior to, through, and beyond January 1, 2000 and shall be transparent to the user.

Hardware, telecommunications and software products, individually and in combination, shall successfully transition into the year 2000 with the correct system date, without human intervention,

including leap year calculations. Hardware and software products, individually and in combination, shall also provide correct results when moving forward or backward in time across the year 2000.

### **3.2.2 FACILITIES SEGMENT**

The system facilities segment includes buildings, utilities, and associated services unless otherwise specified in the Task Order. These facilities are to be located at the Vessel Traffic Center and remote sites. The system facilities shall be designed to shelter and protect all housed equipment and personnel.

Additional specific requirements for facilities at individual ports will also be specified in the Task Order.

#### **3.2.2.1 BUILDING CODE COMPLIANCE**

Except where more stringent requirements are listed below or where more stringent state or local requirements apply, facilities shall conform with the particular model building code upon which the state building code is based, as shown in the Directory of Building Codes and Regulations.

Model building codes are as follows:

- a. National Building Code (NBC-93) of the Building Officials and Code Administrators (BOCA) International, Inc.
- b. Standard Building Code of the Southern Building Code Congress (SBCCI) International, Inc.
- c. Uniform Building Code of the International Conference of Building Officials (ICBO).

##### **3.2.2.1.1 BUILDING CODE COMPLIANCE EXCEPTIONS**

- a. Facilities shall fully comply with both the Life Safety Code (NFPA 101) and the National Electric Code (NFPA 70).
- b. The Uniform Federal Accessibility Standards (UFAS), Fed-STD-795. This standard is not applicable for remote sites.
- c. In earthquake zones #3 or higher and at all Pacific Coast ports, all fuel gas building service lines shall have earthquake shut-off valves.
- d. Aluminum conductors are prohibited for interior power distribution wiring.
- e. Facilities shall utilize fire-resistive or noncombustible construction and be separated from other occupancies by fire-rated walls or partitions. Standard wet pipe or pre-action automatic sprinkler systems shall be provided in electronic equipment areas where combustible materials are

- processed or stored. Automatic power shut-downs shall be installed to cut power to manned equipment in the event sprinkler systems are activated.
- f. Facilities shall conform to NFPA 75 for construction and fire protection requirements. Halon fire suppression systems shall not be utilized.
  - g. Facilities shall comply with the requirements of appropriate parts of the Occupational Safety and Health Act of 1970.
  - h. Facilities shall provide physical security to tenants and installed systems commensurate with local physical security risks.
  - i. VTC locations shall be chosen, or approved, by the Coast Guard as specified in the Task Order.
  - j. Asbestos shall not be utilized.
  - k. Facilities shall be designed for a 30-year service life.
  - l. Facilities construction shall avoid unnecessary harm to historic properties.
  - m. Chlorofluorocarbons shall not be utilized.
  - n. All VTC space housing electronic equipment shall be adequately conditioned in order that the ambient temperature does not exceed 75 degrees Fahrenheit.

#### 3.2.2.2 VTS SYSTEM FACILITIES

VTS system facilities comprise the following:

- a. Improved land, buildings, towers, equipment shelters, parking areas, storage areas, assembly and installation areas, shelter structures, and other real property.
- b. Electrical power, telephone, water, sewer, and, if applicable, cable television and natural gas utilities.
- c. Site access, physical security, maintenance including trash and janitorial service.
- d. Structural, wiring, plumbing, and conduit interfaces necessary to integrate equipment located at the site with the rest of the Port System.
- e. Heating, cooling, ventilation, and lighting commensurate with the VTS systems and staff located at the site.
- f. Safety features, including access at the VTC for persons with disabilities.
- g. Fire prevention, detection, and suppression systems.
- h. Voice, data, video, telephone, intercom, public address, and all other audio communications and associated cable

plant, including switching and routing as required by Task Order.

Each facility (remote sites and the VTC) shall incorporate intrusion and fire detection capabilities. Port system performance, intrusion, and fire status shall be displayed in the VTC in view of the Watch Supervisor. This information shall be organized by site and building, and shall indicate the most recent reported performance, security, and fire status for each location.

### **3.2.2.3 REMOTE SITE FACILITIES**

Remote sites shall be located to provide required surveillance and communications coverage of the VTSA. These sites shall satisfy operational segment AIS and surveillance requirements, and support the needs for remote placement of communication segment equipment.

Building code compliance requirements (Section 3.2.2.1, Building Code Compliance) and general system facility requirements (Section 3.2.2.2, VTS System Facilities) are applicable to remote sites unless otherwise specified by the Task Order.

### **3.2.2.4 POWER**

The Power Distribution System shall accept commercial power as provided by the local electric power utility and shall supplement utility power as necessary to meet specified operational availability requirements.

The VTS system shall:

- a. Provide an Emergency Power System (EPS) at the VTC to provide power during commercial power outages.
- b. Provide a single portable EPS for use at remote sites if required by the Task Order.
- c. Provide an Uninterruptible Power Supply (UPS) to provide power during switchover from commercial power to the EPS at the VTC and each remote site if required by Task Order.

### **3.2.3 SUPPORT SEGMENT**

#### **3.2.3.1 SOFTWARE DEVELOPMENT AND MAINTENANCE**

The VTS system shall provide for the means to modify, tailor, and maintain the VTS system software at the vendor's facility for unique port applications. The system shall provide the capability to package and provide software documentation and upgrades to the port system.

### **3.2.3.2 SYSTEM ADMINISTRATION AND PERFORMANCE MONITORING**

System Administration and System Performance Monitoring shall be implemented across all system segments at each port.

### **3.2.3.3 SYSTEM ADMINISTRATION**

The system shall provide the operator the ability to:

- a. Perform system administration in accordance with the system documentation.
- b. Monitor system events and performance.
- c. Install system upgrades.
- d. Adjust system parameters and connectivity to optimize system performance.
- e. Perform system backup and restoration.
- f. Perform system security administration in accordance with Section 3.5, Security and Privacy Requirements.

## **3.3 SYSTEM EXTERNAL INTERFACE REQUIREMENTS**

External interfaces shall conform to the Interface Control Documents as specified in the SOW.

### **3.3.1 METEOROLOGIC SERVICES INTERFACES**

The external Meteorologic Services Interfaces provide the VTC with the capability to collect meteorologic information and monitor forecasts from the National Weather Service (NWS) and from existing local meteorologic sensors. The interfacing entities include the meteorologic services and sensors, the communications medium and equipment for relaying the meteorologic information into the VTC, and output devices (i.e., monitor, fax, digital data display devices).

### **3.3.2 OCEANOGRAPHIC AND HYDROGRAPHIC SENSORS INTERFACES**

The external Oceanographic and Hydrographic Sensor Interfaces provide the VTC the capability to collect hydrographic and oceanographic information from existing local port sensors, including the NOAA PORTS (if required by Task Order) as available in the port. Interfacing includes the oceanographic and hydrographic sensors, the communications medium and equipment for relaying the sensor information into the VTC, AIS/sensor processors, and output devices (e.g., monitor, fax, digital data display devices).

### **3.3.3 CENTRAL TIMING INTERFACE**

The Central Timing Interface shall provide the system the capability to acquire and synchronize its system date and time with an external timing source.

### **3.3.4 RADIO INTERFACES**

The Radio Interfaces provide connectivity for system AIS, voice and data communications via radio.

### **3.3.5 COMMUNICATIONS SERVICES INTERFACES**

The system shall provide the capability to communicate between the VTC and sensor sites through Government-provided or vendor-provided communications in accordance with the applicable Telecommunications Service Requests as required by Task Order.

### **3.3.6 DATABASE SYSTEMS INTERFACES**

The external Database Systems Interfaces may provide the system with the capability to exchange data (e.g., vessel and voyage information) with other USCG organizations. This operational data shall be acquired from the Coast Guard Operations System Center (OSC) at Martinsburg, West Virginia, if required by the Task Order.

## **3.4 SAFETY REQUIREMENTS**

The system shall be designed and installed for safe operation and maintenance following best commercial procedures and practices, or as specified by the Task Order.

## **3.5 SECURITY AND PRIVACY REQUIREMENTS**

Unless otherwise required by the Task Order(s), the following security measures shall be provided for the system.

Non-proprietary or unclassified data will be provided or disseminated to all users, while proprietary and sensitive-but-unclassified data shall be provided to selected users on a need-to-know basis.

The system shall incorporate controls capable of enforcing access limitations on an individual basis, which shall be suitable for allowing users to be able to protect sensitive information and to keep other users from accidentally reading or destroying data. The processing environment is expected to be one of cooperating users processing data at the same level(s) of sensitivity. Users shall be made individually accountable for their actions through log-in procedures, auditing of security-relevant events, and resource isolation.

The system shall support a system administrator with supervisory privileges. It shall provide a means to identify and protect proprietary secure, or safety-critical information.

### 3.6 SYSTEM ENVIRONMENTAL REQUIREMENT

Table 3-2-5 illustrates the extremes of climatologic and environmental parameters within which the system installations shall function and be capable of surviving:

**TABLE 3-2-5. ENVIRONMENTAL REQUIREMENTS**

REQUIREMENT	OPERATIONAL	SURVIVABLE
Temperature	-25 to 50 deg. C*	-40 to 70 deg C*
Humidity	20% to 100% condensing	0% to 100% condensing
Wind Speed	65 kts sustained, 100kts gusts	65 kts sustained, 140 kts gusts
Weather	Rain, fog, snow, sleet, freezing rain, other conditions that affect visibility.	Rain, fog, snow, sleet, freezing rain, other conditions that affect visibility.
Other	Salt spray, sand, dust, static discharge and vibration.	Lightning strikes, salt water immersion, shock.

\* Temperature parameters shown do not include the effects of solar radiation. These effects will be considered.

Electronic equipment shall not create electromagnetic interference with other equipment in the VTSA and vicinity and shall be protected from such interference. Equipment shall comply with Part 15 of the FCC Rules (47 CFR). Equipment not meeting the environmental criteria in Table 3-2-5 shall be adequately protected by enclosure, air conditioning, ventilation, etc.

### 3.7 SERVICE LIFE

The system shall be designed to have a service life of fifteen(15) years following the port acceptance except for the system computational components, which shall be designed to provide a five (5) year service life.

### **3.8 RELIABILITY, MAINTAINABILITY AND AVAILABILITY**

#### **3.8.1 RELIABILITY**

The system shall be designed to provide the highest level of reliability that is economically feasible. The system shall have the capability to monitor and display or report the condition of its components. The vendor shall use the most cost-effective design method to achieve system reliability. A reliability block diagram shall be used to demonstrate and predict the total system reliability and its critical capabilities.

#### **3.8.2 MAINTAINABILITY**

The system shall be designed to minimize the frequency and adverse impacts of both preventative and corrective maintenance actions on VTS operations and system availability. At no time shall VTS critical capabilities (see Section 3.1.1) be unavailable for more than 108 minutes per month due to system failures and/or maintenance actions.

#### **3.8.3 AVAILABILITY**

The system shall be designed to maximize the Operational Availability of all critical and non-critical capabilities. The VTS system shall operate 7 days a week, 24 hours a day, with an availability of 99.75% for all critical capabilities (see Section 3.1.1). Availability is defined in Section 6.1. The system shall provide this level of availability for all operating environmental conditions specified in Section 3.6.

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#### **4. QUALIFICATION PROVISIONS**

The contractor shall provide assurance through test and evaluation that each system will provide the capabilities and capacities required by this specification as specified in the Statement of Work. Configuration control shall be rigidly enforced as described in the Statement of Work to ensure that each system has been thoroughly evaluated before it is accepted.

##### **4.1 VERIFICATION METHODS**

The Verification Cross-Reference Matrix (VCRM) portion of the Contractor's Test Plan/Procedures shall assign verification methods for each requirement (statements containing the word "shall") within Section 3 of this specification. Each requirement shall be verified by inspection or testing. Testing shall be conducted in two progressive stages: Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E). The system shall be required to pass DT&E tests for system acceptance.

The Contractor shall provide the Government with the opportunity to witness every verification activity.

##### **4.1.1 INSPECTION AND CERTIFICATION**

Verification using the inspection method shall utilize physical examinations of items to check their conformance to form and fit requirements.

Inspection shall utilize configuration management control information and may consist of dimensional checks, inventory, and physical auditing unless otherwise specified in the Task Order.

The Contractor shall perform equipment check-out and certify that the integrated system meets the performance criteria required by this system specification and the SOW prior to shipping the VTS system to the port for installation.

##### **4.1.2 SYSTEM TESTING**

System performance and acceptance shall be conducted in accordance with the Contractor's Test Plan/Procedures as specified in the SOW.

##### **4.1.2.1 DEVELOPMENTAL TEST AND EVALUATION (DT&E)**

DT&E tests shall be performed at the port to verify the complete end-to-end, integrated functionality (hardware, software, and interface functionality) of the system. System acceptance shall occur when all DT&E testing has been satisfactorily completed and all deficiencies have been corrected. The system shall first be installed, checked out, and functionally exercised (with the

exception of radio transmission) for 48 continuous, failure-free hours prior to beginning the final phase of DT&E testing, System Acceptance Test and Evaluation. As part of the end-to-end DT&E testing, the system shall be operated uninterrupted for two weeks to evaluate operational availability and to ensure the system meets SOW and System Specification requirements. During this end-to-end test, the system shall be fully loaded, receiving data from up to 100 DSC/AIS transponders and 200 targets per radar scan.

#### **4.1.2.2 OPERATIONAL TEST AND EVALUATION (OT&E)**

Following successful DT&E testing, which constitutes acceptance of the system, the system shall be tested by the Coast Guard and these tests shall be supported by the Contractor.

#### **4.2 CALIBRATION AND MAINTENANCE OF MEASUREMENT AND TEST EQUIPMENT**

All measurement and test equipment used in the tests shall be calibrated. Calibration documentation shall be made available to the Government.

## 5. REQUIREMENTS TRACEABILITY

The system shall conform to this specification and the SOW as described by the Requirements Traceability Matrix (RTM). All requirements contained in this specification and the SOW shall be traced to the System Design Documents.

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## 6. NOTES

### 6.1 GLOSSARY

Advisory: Notification that a situation exists that is out of the ordinary but does not require evasive or emergency action.

Alarm: Notification that a hazardous situation exists. Should provide enough time for emergency action to be initiated.

Alert: Notification that a hazardous situation may exist in the near future if events on the waterway progress unchecked. Should provide enough time for the ship operator to evaluate pertinent information and take evasive action.

Allision: A vessel hitting a fixed object such as a buoy, dock or bridge support structure. (Also called a ramming.)

Approximate Position: Position expressed relative to a geographic landmark. Examples are "near MM10," or "at English Turn Bend."

Availability: Availability (A) is the probability that a system or equipment, when used under stated conditions in an actual operational environment, shall operate satisfactorily at a given point in time. It includes ready time, logistics time, and waiting or administrative downtime. A is expressed as:

$$A = \text{MTBF} / (\text{MTBF} + \text{MDT})$$

where MTBF is mean time between failure and MDT is mean down time. MDT includes diagnosis and repair time, preventative maintenance time, and logistics time (time spent waiting for personnel, spare parts, authorization, and other causes.)

Bearing: The angular direction of one terrestrial point from another, expressed as degrees from a reference direction, usually from 000° clockwise through 359°.

Captain of the Port (COTP): The Coast Guard officer designated by the Commandant to command a Captain of the Port Zone as described in 33 CFR Part 3. The COTP's duties (delegated to Commanding Officers of the VTS) involve directing the operation, movement, and anchoring of vessels within a Vessel Traffic Services Area, including management of vessel traffic within anchorages, regulated navigation areas and safety zones, and to enforce VTS and ports and waterways safety regulations.

Clear Weather: The absence of atmospheric impediments such as fog, mist, falling snow, rain, blowing sand, smog, smoke.

Commercial-Off-The-Shelf: Commercial Off-the-Shelf (COTS) describes systems or components that are widely available to the general public through the commercial market at competitive prices. The items are normally commodity-type products developed to commercial standards to satisfy the needs of large groups of users, although this is not always the case.

Configuration Item: The lowest level for which accountability is maintained in accordance with the Configuration Management Plan. A configuration item consists of either hardware (hardware configuration items, or HWCIs), or software (computer software configuration items, or CSCIs).

Collision: Two or more moving vessels running into each other.

Contingency Response: The VTS operational contingency response in time of national or port emergency is similar to the routine. In general, an emergency requires an increased state of awareness on the part of VTS personnel. From a VTS standpoint, there are two types of emergencies: (1) a national defense emergency which involves the movement of government, public or private vessels in response to a security threat, and (2) a port emergency which involves the movement of government, public or private vessels in response to an environmental or civil disaster. The primary role of VTS in either type of emergency is to facilitate the movement of response vessels without disrupting the orderly flow of commerce. During a national defense emergency, there will be an increased emphasis on vessel movements in and around a specific area such as a safety zone. In either case it is likely that there will be prioritized vessel movements.

Current Estimated Position: An estimation of vessel location at the present time based on standard route parameters or operator-entered parameters.

Detect: The ability to determine the presence or absence of mandatory participants and selected vessels in the VTSA.

Discretionary Access Control: A means of restricting access to objects based on the identity of subjects and/or groups to which they belong. The controls are discretionary in the sense that a subject with a certain access permission is capable of passing that permission (perhaps indirectly) on to any other subject (unless restrained by mandatory access control).

Encounter: A meeting between a vessel and another vessel or moving object, crossing vessels, and overtaking situations among vessels.

Estimated Position Track: The most probable position of a craft determined from incomplete data or data of questionable accuracy.

External Interface: An external interface of the system is defined as any interface where at least one item of equipment or services involved in the interface is not under the control of the vendor.

False Alarm: An erroneous sensor target detection decision caused by noise or other interfering signals exceeding the detection threshold.

Facilitate Commerce: Enhance the effect interchange of goods and services in ports, with safety being an essential characteristic of effectiveness.

Government Off-the-Shelf: (GOTS) describes systems or components that are available on existing government contracts to satisfy agency requirements. GOTS items are typically commodity-type items that have a commercial counterpart and may have been modified or updated to satisfy a specific mission requirement.

High Visibility: The condition in which visibility is not restricted by fog, mist, falling snow, rain, blowing sand, smog, smoke or any other similar causes.

Incident: An unusual event.

Identify: The ability to determine the name of an already detected mandatory participant.

Intended Route: Specific selection of route(s) that a vessel master has indicated will be used as the vessel navigates the VTSA.

Interface: An interconnection between subsystems having the dimensions of form, fit, and function, which are determined by the requirements of the interconnected subsystems.

Low Visibility: The condition in which visibility is restricted by fog, mist, falling snow, rain, blowing sand, smog, smoke or other causes. The lower limit of visibility approaches 0.5 nm.

Maintainability: Maintainability is a characteristic of design which, when achieved, contributes to fast, easy maintenance at the lowest life-cycle cost.

Mandatory Participant: Vessel required by 33 CFR Part 161 to comply with VTS procedures and participate in a VTS.

Maritime Mobile Radio Service: A mobile radio service between coast stations and ship stations, or between ship stations (Reference 47 CFR Section 2.1, 80.5, and the international Radio Regulations adopted in Geneva in 1982).

Mean Time Between Failure (MTBF): A measure of merit of the reliability of a configuration item, defined as the average length of time between failure occurrences. In this context, failures arising from external causes are excluded, and all inherent failures are included.

Mean Time to Repair (MTTR): A measure of merit of the maintainability of a configuration item, defined as the average length of time needed to repair or replace a failed item. In this context, all form of wait time is excluded.

Operational Notice: Operator entered free text message used for reference or as a reminder.

Operators: Watchstanders, watch supervisors, and system administrators, trainers and trainees who work the system from within the VTC.

Predicted Position Track: A position track calculated by using the last known vessel position and a position-fixing or other means such as dead reckoning.

Reliability: Reliability is defined as the probability that a system or component will perform its capabilities under given conditions for a specified period of time.

Safety Zone: Limited-access water, shore, or combination established by the COTP or district commander to ensure safety and environmental protection beyond that of normal port operations. Often established on a temporary and emergency basis in response to some event on the waterway. May be stationary (described by fixed boundaries) or described as an area around an object (e.g., vessel) in motion.

Sailing Plan: A report required from vessels prior to navigating the VTSA indicating intended route and other relevant information. Sailing Plans are updated by Position Reports, Sailing Plan Deviation Reports and Final Reports (33 CFR 161.19-161.22).

Sector: A subdivision of the VTSA which is assigned to an individual operator or to the watch supervisor on a shift. A sector can include the entire VTSA in some ports.

Sector Configuration: A set of sectors that are geographically exclusive and cover the entire VTSA.

Security Zone: Limited-access area in the water, on the shore, or a combination established by the COPT or district commander. It is established to ensure security, safety, and environmental protection beyond that of normal port operations for a time necessary to prevent damage or injury to any vessel, waterfront facility, or port area in the interest of national security. The zone may be stationary or a moving zone around a vessel in motion.

Segment: The level of configuration immediately below system. There are three system segments: operational, facilities, and support.

Selected Vessel: Vessel not required by 33 CFR Part 161 to comply with VTS procedures and participate in the system at a particular port or ports but detected by the system and considered to be of interest due to location, course, abnormal behavior, present VTSA situation, or other reason.

Sensitive Information: Any information of which the loss, misuse, or unauthorized access to or modification of could adversely affect the national interest or the conduct of Federal programs, or the privacy to which individuals are entitled under Section 552a of Title 5, United States Code (the Privacy Act), but which has not been specifically authorized under criteria established by an Executive Order or an Act of Congress to be kept secret in the interest of national defense or foreign policy.

Space Management: A form of control at which the VTS grants or denies permission to vessels to move within a particular portion of a waterway while leaving navigation within that portion of waterway up to the vessel operator, or sets restrictions on all movements within a particular part of a waterway.

Space Management Zone: An area with defined boundaries that has defined space management parameters assigned to it. Examples are safety and security zones, permanent traffic lanes, or other COTP-originated zones.

Special Activities: Special activities are planned waterway activities that, by their nature, may affect waterway traffic. Examples include, but are not limited to, dredging, regattas, and oversize ship movements.

Special Navigation Zone: Area with defined boundaries that has defined space management parameters assigned to it. Examples are Safety Zone, Security Zone, Traffic Separation Scheme.

Speed: Rate of motion, or distance per unit of time.

Surveillance: The observation of an area or space for the purpose of determining the position and movements of targets in that area or space.

Swing Circle: A circle depicted on a display device, centered at the estimated drop-anchor point, which is intended to depict the limits of movement of an anchored vessel.

Synchronous Replay: The time-coordinated replay of data recorded by separate devices, whether on the same or separate media.

System Administrator: A person in the VTC who administers system security, monitors and optimizes system performance, performs system backup and restoration, installs system upgrades, performs data and data base management, and performs port system configuration management.

Target: An object, stationary or moving, about which information is sought with a sensor.

Track Data: Sensor or AIS data that has been mathematically manipulated to smooth the movement of targets for display.

Tracking: Measurement of the position coordinates of a target to provide data to determine the target path versus time.

Traffic Image: A comprehensive overview of the VTSA containing insight to all traffic-influencing factors with full information about the waterway situation and each participating vessel including its position, identity and intentions. A traffic image is the basis for the System's ability to respond to traffic situations developing in the VTSA by providing and presenting information to VTS personnel so they may evaluate the situation and make their decisions accordingly.

Traffic Situation Display: A dynamic annotated graphical display of vessel positions overlaid on a VTSA chart. Annotations at a minimum include identify of vessel, course, and an indication of speed.

Traffic Situation Prediction: A prediction of what vessels will be within a specified area of the VTSA within a specified period of time to be used for determining potential congested areas.

Users: Mariners, COTPs, other Coast Guard personnel, and others who exchange information with the system.

Vessel: Every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water. (In this specification the term

"vessel" is used to denote mandatory participating vessels and selected vessels.)

Vessel Traffic Center (VTC): The shore-based facility that operates the vessel traffic service for the Vessel Traffic Service area or sector within such an area.

Vessel Traffic Service (VTS): A service implemented under 33 CFR Part 161 by the United States Coast Guard designed to improve the safety and efficiency of vessel traffic and to protect the environment. The VTS has the capability to interact with marine traffic and respond to traffic situations developing in the VTS area.

Vessel Traffic Service Area (VTSA): The geographical area encompassing a specific VTS area of service as described in 33 CFR Part 161. This geographical area may be subdivided into sectors for the purpose of allocating responsibility to individual Vessel Traffic Centers or to identify different operating requirements.

Watchstander: A military member or civilian employee of the Coast Guard, or an employee or representative of the marine community, located in the VTC, who monitors vessel movements, updates data within the system based on inputs from sensors and voice communications, and who disseminates information to users. See Operator.

Watch Supervisor: A member of the Coast Guard or a civilian employee, located in the VTC, who directs operators.

Waypoint: A predetermined geographic position used for route definition or progress reporting purposes.

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